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Four new species of *Diploharpus* Chaudoir, 1850 from Ecuador** (Coleoptera, Carabidae, Perigonini)

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Abstract
Diploharpus Chaudoir 1850 is a neotropical genus of the carabid tribe Perigonini, widespread in Central and South America from Mexico to Bolivia. *Diploharpus* adults are found under barks of dead trees and in rotting logs in tropical rainforests and montane subtropical forests. This work includes descriptions, illustrations, and distributional data for four new Ecuadorian species: *Diploharpus pubescens* n. sp. (type locality: Sucumbíos province, El Higuerón, 1850 m), *Diploharpus curtulus* n. sp., *Diploharpus iridescens* n. sp., and *Diploharpus rossii* n. sp. (type locality of these three species: Cotopaxi province, Otonga, 1900 to 2000 m).

Key words: Taxonomy, new species, Ecuador, Andean subtropical fauna.

Resumen
Diploharpus Chaudoir 1850 es un género neotropical de la tribu Perigonini, ampliamente distribuido en América Central y Suramérica desde México hasta Bolivia. Los adultos de *Diploharpus* se encuentran bajo la corteza de los árboles muertos o en troncos podridos en el bosque húmedo tropical y en el bosque montano subtropical. Este trabajo incluye las descripciones, ilustraciones y datos de distribución geográfica de cuatro especies nuevas del Ecuador: *Diploharpus pubescens* n. sp. (localidad típica: prov. Sucumbíos, El Higuerón, 1850 m), *Diploharpus curtulus* n. sp., *Diploharpus iridescens* n. sp. y *Diploharpus rossii* n. sp. (localidad típica de las tres últimas: prov. Cotopaxi, Otonga, 1900 a 2000 m).

Palabras clave: Taxonomía, nuevas especies, Ecuador, fauna andina subtropical.

Introduction
The purpose of this paper is twofold. On the one hand, it is a preliminary contribution to the taxonomy of *Diploharpus* Chaudoir 1850, in so far as the newly described species reveal a higher degree of intrageneric morphological variability than expected from the previously known taxa. On the other hand, these descriptions are intended to provide a taxonomic validation for new species occuring in Otonga Natural Reserve (Ecuador, province Cotopaxi), as a means to prepare a comprehensive study of the Carabid assemblage found in that interesting montane biotope situated on the western slope of the Ecuadorian Andes.

Diploharpus is a conspicuous genus of Perigonine carabids, easy to recognize by its elongated mouthparts, convex body and relatively large size. It was created by Maximilien de Chaudoir for one species found in Eastern Brazil, *Diploharpus laevissimus* Chaudoir, 1850 (hence type of the genus). In three separate papers, Henry Walter Bates described four species collected by himself in Brazilian Amazon (*D. ebeninus* Bates, 1872, *D. rubripes* Bates, 1872, *D. sexstriatus* Bates, 1872 and *D. striolatus* Bates, 1872), one species from Chontales, Nicaragua (*D. exstriatus* Bates, 1878), and one more species from Guatemala (*D. perpolitus* Bates, 1882). He also moved to *Diploharpus* a mexican species described as *Drimostoma mexicanum* by Chevrolat in, 1841. Nothing new was published about this genus during more than one century, until Georges G. Perrault described another two species: *D. laevigatus* Perrault, 1992 from French Guyana and Brazil (Pará), and *D. termitophilus* Perrault, 1992 from French Guyana. In a second contribution published the same year, Perrault designated lectotypes for Chaudoir's, Bates' and Chevrolat's species, and removed *D. sexstriatus* Bates, 1872 from *Diploharpus* to the genus *Perigona* Castelnau 1835 (Perrault, 1992 b: 172). As a result, *Diploharpus* includes the following nine valid described species:

D. ebeninus Bates, 1872 (Amazon and Eastern Ecuador)
D. exstriatus Bates, 1878 (Central America, Mexico)
D. laevigatus Perrault, 1992 (Guyana, Amazon)
D. laevissimus Chaudoir, 1850 (Eastern Brazil)
D. mexicanus (Chevrolat, 1841) (Mexico, Central America)
D. perpolitus Bates, 1882 (Central America)
D. rubripes Bates, 1872 (Amazon)
D. striolatus Bates, 1872 (Amazon, Bolivia)
D. termitophilus Perrault, 1992 (Guyana)

Nevertheless, there has been no attempt to revise the genus, not even a comprehensive and updated definition of it, or a key to the described species, since most of the above mentioned descriptions were single species treatments in more gene-

ral papers treating regional carabid faunas.

Some diagnostic elements can be extracted from Jeannel's key to world Perigonini (Jeannel, 1941: 138), from Ball and Reichardt's key to neotropical Carabidae (Reichardt, 1977: 416) and from remarks of Perrault (1992 a) about presence or absence of a sulcus at apex of the 7th elytral stria, but these brief and partial indications do not support a full definition of the genus. In such conditions, what follows is nothing but a tentative and preliminary diagnosis of *Diploharpus*:

Total body length ranging from 5.6 to 10.8 mm, bigger in average than other Perigonine genera. Integuments usually smooth and shiny, black to rufopiceous. Head lengthened, mandibles elongated, straight and porrected; maxillae and palpi thin and elongated. Penultimate maxillary palpomere longer than terminal (from one and a half to two times longer). Supraorbital carinae extended at least to the first supraorbital seta. Pronotum transverse, lateral groove explanate posteriorly. Elytra oval and convex. Striae 1 to 7 shallowly impressed, or almost obsolete, or wholly effaced. External edge of 8th interval transformed in its distal fourth into a strong carina obliquely extended vor almost to apical sutural angle (fig. 6-7). In one group of species, there is also an oblique carinate sulcus at the end of the 7th interval (fig. 8). Three setae in the 3rd interval, the first two ones on the disc and the third one near apex (these setae are vestigial or completely vanished in some species). Umbilicate lateral setae divided in four groups, namely, 5 setigerous punctures in the humeral group (rarely 4), 2 and 3 punctures in two separate median groups, and 4 punctures in the apical group.

Materials and methods

This study is based on examination of approximately 130 specimens, including holotypes or lectotypes of the species described by Chaudoir, Chevrolat, Bates and Perrault, all kept in the Muséum National d'Histoire Naturelle of Paris. Comparison with these type specimens allowed us to recognize several undescribed species within materials collected in Ecuador during the last two decades. However, the four species treated hereafter represent only a small part of the existing undescribed material.

The type material of the four new species will be deposited in the following institutions or private collections, noted in the text by the associated codens:

CAC: Achille Casale Collection, Torino, Italy.
CPM: Author's Collection, Toulouse, France.
CPMG: Pier Mauro Giachino Collection, Torino, Italy.
MNHN: Muséum National d'Histoire Naturelle, Paris, France.
QCAZ: Museo de Zoología, Pontificia Universidad Católica del Ecuador, Quito, Ecuador.
MCNQ: Museo de Ciencias Naturales, Quito, Ecuador.

Taxonomic criteria and general working methods follow those previously described (Moret, 2005). The total body length is measured from apex of longitudinally extended mandibles to apex of longer elytron.

Diploharpus pubescens new species
(figs. 1, 7, 10)

Type series: HT♂, Ecuador, Provincia Sucumbíos, km 9 W La Bonita, El Higuerón, 26.VII.1998, 1850 m, leg. I. Tapia & P. Moret (MNHN). PTT: 4 ♀♀ 3 ♂♂, same data as the holotype (MNHN, CPM).

Description

Habitus: fig. 1. Total body length: 6.9 to 7.8 mm. Head, pronotum and elytra shiny black, with vanished microsculpture on pronotum and elytra.

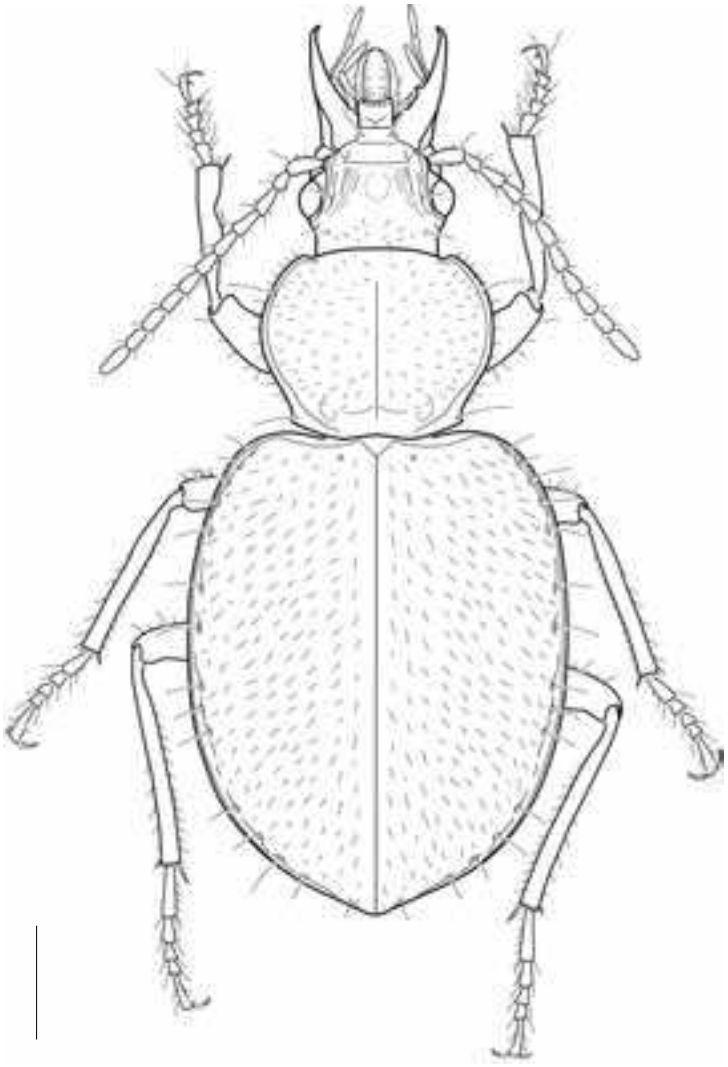


Fig. 1. *Diploharpus pubescens* n. sp., male holotype: habitus. Scale bar 1 mm.

Legs, antennae and palpi wholly testaceous. A scarce but fairly long pubescence covers the dorsal surface of neck, pronotum, elytra, abdominal sternites and prosternum. Each seta is inserted in a tiny puncture that gives to the integument an irregular, rugose aspect.

Head broad; mandibles thin and elongate, longer than head (the latter being measured from base of the neck to apex of clypeus). A rugose oval depression in the middle of the vertex; supraorbital areas deeply and broadly wrinckled. Eyes relatively small, though convex and prominent. Genae obliquely rectilineous. Antennae short and thick; in backfolded position, they do not extend beyond the base of the pronotum.

Pronotum transverse, lateral margins strongly arcuate medially, slightly sinuate basally. Anterior angles broadly obtuse, not prominent; hind angles obtuse, sharp; disc strongly convex. Lateral groove narrow, shortly broadened near base. Base not beaded; anterior margin narrowly beaded laterally. Posterolateral impressions oval, shallowly impressed. One pair of anterolateral setae; one pair of posterolateral setae close to hind angles.

Hind wings reduced. Elytra short, oval, very convex. Base broader than pronotal base, humeri broadly rounded, projected anterad; basal ridge sinuate. Lateral margins not serrulate. Sides moderately arcuate medially, their maximum width at middle. Apical margin subsinuate before sutural angle. Striae not evident, yet the setigerous punctures are vaguely arranged in longitudinal rows. Basal stria absent. External edge of 8th interval convex and bluntly carinate apically, but the resulting sulcus is less strongly impressed than in other species of the genus; 7th stria not sulcate near apex (fig. 7).

Elytral chaetotaxy: parascutellar seta present; the discal setae of the third interval can not be distinguished from the general pubescence. Umbilicate setigerous punctures: 5-2-3-4. One apical seta at the end of the 8th interval.

Male genitalia: fig. 10.

Habitat

Found in a rotten log in subtropical montane forest. Active after sunset, roaming on the surface of the log (personal observation at El Higuerón, VII.26.1998).

Geographical distribution

Known only from the type locality at El Higuerón, Ecuador, on the eastern slope of the Andean Cordillera (fig. 14).

Etymology

Latin epithet alluding to the conspicuous pubescence of the body.

Diploharpus iridescens new species
(figs. 2, 11)

Type series: HT♂, Ecuador, Provincia Cotopaxi, Otonga, 1950 m, 3-5.VII.2001, leg. P. Moret / Sous-bois, tronc pourri (MNHN). PTT: 1 ♀ 2 ♂♂ same data as the holotype (CPM).

Description

Habitus: fig. 2. Total body length: 8.5 to 9.1 mm. Head, pronotum and elytra black with a conspicuous shiny iridescence, especially on the elytra, caused by the transverse mesh pattern of the microsculpture. Antennae and palpi flavescent, legs flavescent with darker femora.

Head elongate; mandibles very long, thin and acute. Eyes large but relatively flattened.

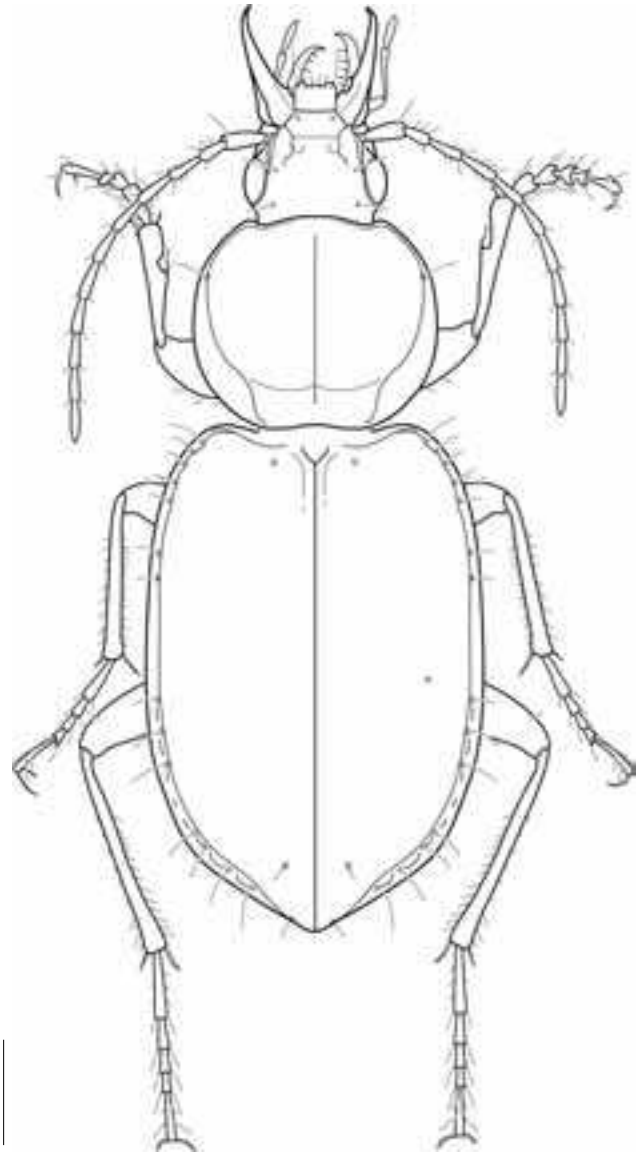


Fig. 2. *Diploharpus iridescens* n. sp., male holotype: habitus Scale bar 1 mm.

Supraorbital carinae short, extended backwards to the first supraorbital seta. Antennae long and slender; in backfolded position, antennomeres 10 and 11 extended beyond base of pronotum.

Pronotum slightly transverse, with broadly arcuate lateral margins. Anterior angles obtusely prominent; hind angles completely rounded; disc smooth and convex. Lateral groove narrow in distal fourth, getting progressively broader backwards, widely explanate near base. Base not beaded; anterior margin narrowly beaded laterally; lateral margin beaded anterad anterolateral seta. One pair of anterolateral setae; posterolateral pair absent.

Elytra elongate, subparallel, moderately convex, smooth and impunctate. Base broader than pronotal base, but significantly narrower than in other *Diploharpus* species. Humeri briefly rounded and prominent; basal ridge sinuate. Lateral margin not serrulate. Sides subparallel, their maximum width after the middle. Apex fusiform, narrowly rounded. Striae 1 to 7 completely vanished, except the beginning of the first stria which is shallowly impressed. Basal stria absent. External edge of 8th interval strongly carinate near apex. Seventh stria not sulcate near apex. No visible pubescence in the marginal groove.

Elytral chaetotaxy: parascutellar seta present; one preapical seta at the end of the 3rd interval; no discal setae, except on the right elytron of the holotype that bears a single postmedian seta in the 5th interval. Umbilicate setigerous punctures: 5-2-3-4. One apical seta at the very end of the 8th interval.

Male genitalia: fig. 11.

Habitat

Found in rotten logs in subtropical montane forest.

Geographical distribution

Known only from the type locality at Otonga, Ecuador, on the western slope of the Andean Cordillera (fig. 14).

Etymology

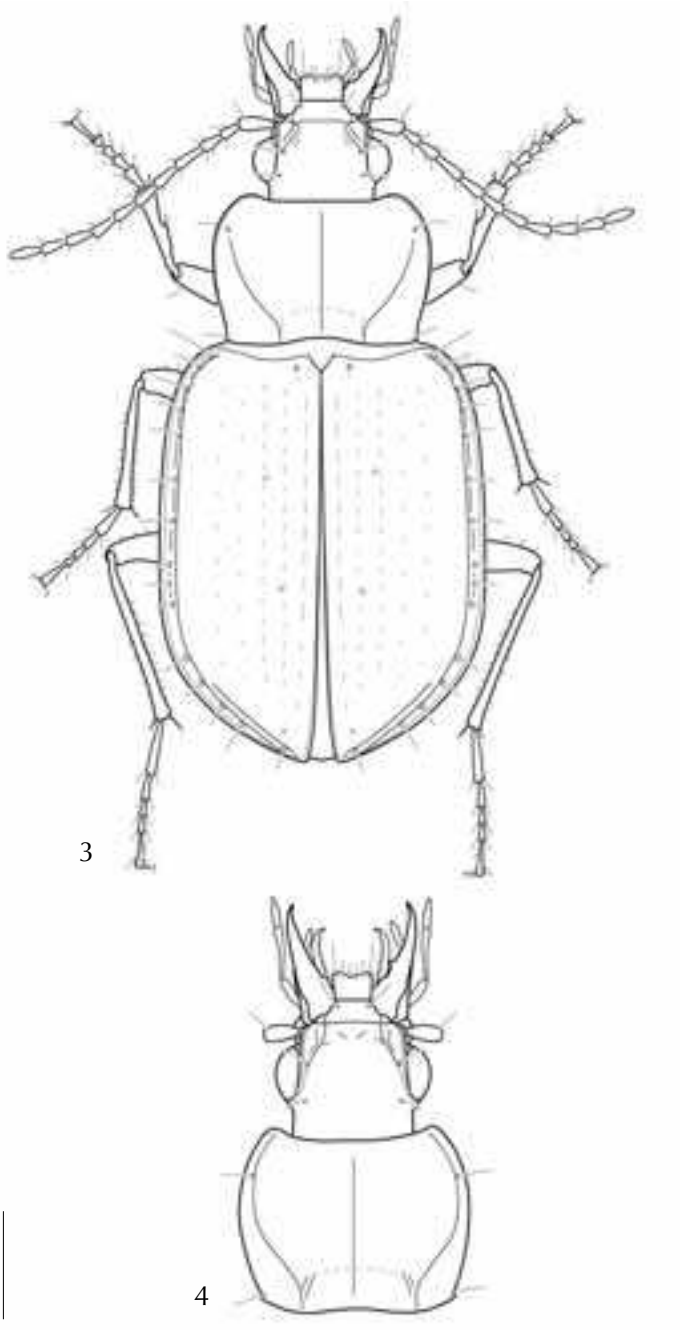
Latin epithet alluding to the conspicuous iridescence of the body surface.

Diploharpus curtulus new species
(figs. 3, 5, 12)

Type series: HT♂, Ecuador, Provincia Cotopaxi, Cantón Sigchos, Las Pampas, Otonga Natural Reserve, 25-28.VII.2005, leg. W. Rossi (MNHN). PTT: 3 spec. same data as the holotype (CPM, CPMG, CAC). 2 spec., Ecuador, Cotopaxi, Cantón Sigchos, Las Pampas, Otonga Natural Reserve, 7-10.VII.2006, leg. W. Rossi (CPM, CPMG). 1 spec., Ecuador, Cotopaxi, Otonga, 2065 m, S 00° 25' 01.2'' W 79° 00' 14.0'', 21-23.VII.2006, leg. P. M. Giachino (CPMG). 1 paratype: Ecuador, Cotopaxi, Otonga (foresta nublada), 2000 m, 25-30.VII.2004, leg. G. Osella (CPMG). 1 spec., Ecuador, Cotopaxi, San Francisco de las Pampas, Otonga, 2000 m, 25.II.1998, leg. G. Onore (QCAZ). 2 spec., Ecuador, Cotopaxi, Otonga, 1900 m, 7.VIII.1998, leg. I. Tapia (QCAZ).

Description

Habitus: fig. 3. Total body length: 5.7 to 6.8 mm.



Figs. 3-4. Habitus. 3: *Diploharpus curtulus* n. sp., male holotype; 4: *D. rossii* n. sp., male holotype, head and pronotum. Scale bar 1 mm.

Head, pronotum and elytra shiny black or brownish-black. Legs, antennae and palpi wholly flavo-testaceous. Elytra markedly iridescent, pronotum slightly iridescent.

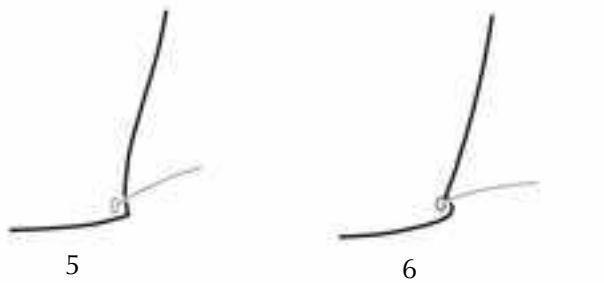
Head stout, broader than long; mandibles strong and sharp, less elongate than in other related species. Eyes large, strongly convex and prominent; genae very short. Supraorbital carinae short and rugose, extended backwards to the first supraorbital seta. Antennae moderately elongate; in backfolded position, antennomeres 10 and 11 extended beyond base of pronotum.

Prothorax transverse (WP/LP = 1,63), subquadrate. Basal margin bisinuate. Lateral margins feebly sinuate or subsinuate in basal third. Anterior angles broadly rounded; hind angles obtuse or subrectangular, sharp, sometimes subdenticulate (fig. 5; note that slight variations can be observed in the shape of hind angles or in the basal sinuation of the margins). Lateral groove broadly expanded and reflexed, broader near base. Posterolateral impressions short and shallow, partly coalescent with the oblique internal limit of lateral grooves. Basal and anterior margins not beaded; lateral margin beaded in distal half. One pair of anterolateral setae; one pair of posterolateral setae close to hind angles.

Hind wings fully developed. Elytra broad, feebly convex (in lateral view, the highest point of the elytra is not higher than pronotal summit). Base much broader than pronotal base; humeri broadly rounded; basal ridge sinuate. Sides subparallel to second third, then markedly arcuate, apex obliquely truncate. Lateral margins not serrulate. Basal stria very short, almost obsolete. Striae 1, 2 and 3 almost erased but generally distinguisheable, with slightly convex intervals ; striae 4 to 7 variable, obsolete to completely erased. 7th interval carinate along the apical segment of the 7th stria which is deeply sulcate; 8th interval narrow, convex, subcarinate. Marginal groove scantily pubescent.

Elytral chaetotaxy: parascutellar seta present; 3rd interval with two discal setae and a third seta near apex. The punctures of these three setae are very little, almost erased and difficult to see in some specimens. One apical seta at the very end of the 8th interval. Umbilicate setigerous punctures: 5-2-3-4.

Male genitalia: fig. 12.



Figs. 5-6. Right hind angle of the pronotum. 5: *Diploharpus curtulus* n. sp.; 6: *D. rossii* n. sp.

Habitat

Found in rotten logs in subtropical montane forest.

Geographical distribution

Known only from the type locality at Otonga, Ecuador, on the western slope of the Andean Cordillera (fig. 14).

Etymology

Latin epithet alluding to the small size of this species.

Diploharpus rossii new species

(figs. 4, 6, 9, 13)

Type series: HT♂, Ecuador, Provincia Cotopaxi, Cantón Sigchos, Las Pampas, Otonga Natural Reserve, 25-28.VII.2005, leg. W. Rossi (MNHN). PTT: 11 spec., same data as the holotype (CPMG, CAC, CPM). 19 spec., Ecuador, Cotopaxi, Cantón Sigchos, Las Pampas, Otonga Natural Reserve, 7-10.VII.2006, leg. W. Rossi (CPM, CPMG). 57 spec., Ecuador, Cotopaxi, Cantón Sigchos, Las Pampas, Bosque Integral de Otonga, 11-12.VII.2007, leg. W. Rossi (CAC, CPMG, CPM, MCNQ). 3 spec., Ecuador, Cotopaxi, Cantón Sigchos, Las Pampas, Otonga Natural Reserve, 7.XII.2006, leg. C. Proaño Castro (CPMG). 1 spec., Ecuador, Cotopaxi, Otonga, 1950 m, 3-5.VII.2001, leg. P. Moret / Sous-bois, litière, 19 h – 20 h (CPM). 2 spec., Ecuador, Cotopaxi, Reserva de Otonga, W 79° 00' - S 00° 25', 1800 m, 9.V.1998, leg. Z. Aguilar (QCAZ). 1 spec., Ecuador, Cotopaxi, Reserva Otonga, W 79° 00' - S 00° 25', 1800 m, V.1998, leg. S. Morillo (QCAZ). 1 spec., Ecuador, Cotopaxi, Otonga, 2000 m, S 00° 27' - W 79° 01', 2.V.1997, leg. E. Gortaire (QCAZ).

Description

Habitus: fig. 4. Total body length: 6.7 to 7.6 mm. Head, pronotum and elytra shiny black or brownish-black. Legs, antennae and palpi wholly flavo-testaceous. Microsculpture: mesh pattern partly obsolete, slightly iridescent.

Head strong, moderately elongate; mandibles long and acute, longer than distance between sockets of antennae. Eyes large and convex; genae short. Supraorbital carinae short and rugose, extended backwards to the first supraorbital seta. Antennae elongate; in backfolded position, antennomeres 10 and 11 extended beyond base of pronotum.

Prothorax moderately transverse (WP/LP =

1,37). Basal margin bisinuate. Lateral margins arcuate medially, feebly arcuate to rectilineous (not sinuate) before hind angles. Anterior angles rounded; hind angles obtuse, bluntly denticulate (fig. 6). Lateral groove relatively narrow, moderately expanded basally. Posterolateral impressions distinct from the oblique internal limit of lateral grooves. Basal and anterior margins not beaded. One pair of anterolateral setae; one pair of posterolateral setae close to hind angles.

Hind wings fully developed. Elytra broad, strongly convex (in lateral view, the highest point of the elytra, at middle, is much higher than pronotal summit). Base much broader than pronotal base; humeri broadly rounded; basal ridge sinuate. Sides subparallel to second third, then markedly arcuate, apex obliquely truncate. Lateral margin not serrulate. Basal stria short. Striae 1, 2 and 3 obsolete, more or less visible, with slightly convex intervals; striae 4 to 7 variable, obsolete to completely erased. 7th interval carinate along the apical segment of the 7th stria which is deeply sulcate; 8th interval narrow, convex, subcarinate (fig. 9). Marginal groove scantily pubescent.

Elytral chaetotaxy: parascutellar seta present; no visible setae on the 3rd interval. One apical seta at the very end of the 8th interval. Umbilicate setigerous punctures: 5-2-3-4.

Male genitalia: fig. 13.

Habitat

Found in rotten logs in subtropical montane forest. Active after sunset on the surface of the forest leaf litter (personal observation at Otonga, VII.5.2001).

Geographical distribution

Known only from the type locality at Otonga, Ecuador, on the western slope of the Andean Cordillera (fig. 14).

Etymology

Named in honor of Walter Rossi, distinguished specialist of Laboulbenial fungi, who collected most of the type material.

D. curtulus n. sp. and *D. rossii* n. sp. are closely related species, whose recognition may be sometimes difficult. The main differences are the following:

— Maximum body length under 7 mm (*curtulus*); minimum body length over 6,5 mm (*rossii*).

— Mandibles as long as distance between sockets of antennae (*curtulus*); mandibles longer than distance between sockets of antennae (*rossii*).

— Elytra markedly convex, higher than pronotum (*rossii*); feebly convex, not higher than pronotum (*curtulus*).

— Pronotum markedly transverse, WP/LP = 1,63 (*curtulus*); less transverse, WP/LP = 1,37 (*rossii*).

— Lateral margin of pronotum sinuate to subsinuate basally, with sharp hind angles (*curtulus*); subrectilineous basally, with bluntly denticulate hind angles (*rossii*).

— Three shallowly impressed, hardly visible setigerous punctures on the 3rd interval (*curtulus*); setigerous punctures completely effaced (*rossii*).

— Male genitalia: apex of median lobe incurved downwards, hook-shaped (*curtulus*); apex of median lobe rectilineous, with a blunt point (*rossii*). Left paramere very short (*curtulus*); left paramere bigger (*rossii*).

Discussion

Systematics

Our study confirms the existence of two groups of species, based on the sculpture of the distal part of the 7th and 8th intervals (fig. 7-9). In all the species of the genus, the external edge of 8th interval forms in its distal fourth a strong carina obliquely extended almost to apical sutural angle. In part of the species, there is also a shorter carinate sulcus at the end of the 7th interval, abruptly terminated anteriorly (fig. 9). This character was firstly observed by Bates (1882: 134) on *D. mexicanus* (Chevrolat), as differing from *D. laevissimus* Chaudoir. Jeannel thought erroneously that an apically sulcate 7th interval was a shared character of the whole genus (1941: 138). The recognition of two groups of species is due to G.G. Perrault (1992a: 99). According to him, the bicarinate species are *D. mexicanus* (Chevrolat), *D. perpolitus* Bates and *D. striolatus* Bates. The

Figs. 7-9. Apex of left elytron, oblique posterolateral view; 7: *Diploharpus pubescens* n. sp.; 8: *D. laevissimus* Chaudoir 1850; 9: *D. rossii* n. sp.

rest of the described species only have a distal carina on the 8th interval.

In order to clarify the taxonomy, the name "Group of *D. laevissimus* Chaudoir" is given to the group of species that possess a distal carina only on the 8th interval. It includes seven described taxa: *D. ebeninus* Bates, 1872, *D. exstriatus* Bates, 1878, *D. laevigatus* Perrault, 1992, *D. laevissimus* Chaudoir, 1850, *D. iridescens* n. sp., *D. rubripes* Bates, 1872 and *D. termitophilus* Perrault, 1992.

In this group, *Diploharpus iridescens* n. sp. presents a unique combination of characters: eyes flattened, rounded pronotum lacking lateroposterior pair of setae, highly iridescent integuments, completely effaced elytral striae.

The name "Group of *D. mexicanus* (Chevrolat)" is given to the group of species that possess a distal carina on both 7th and 8th intervals. It includes five described taxa: *D. curtulus* n. sp., *D. mexicanus* (Chevrolat, 1841), *D. perpolitus* Bates, 1882, *D. rossii* n. sp. and *D. striolatus* Bates, 1872.

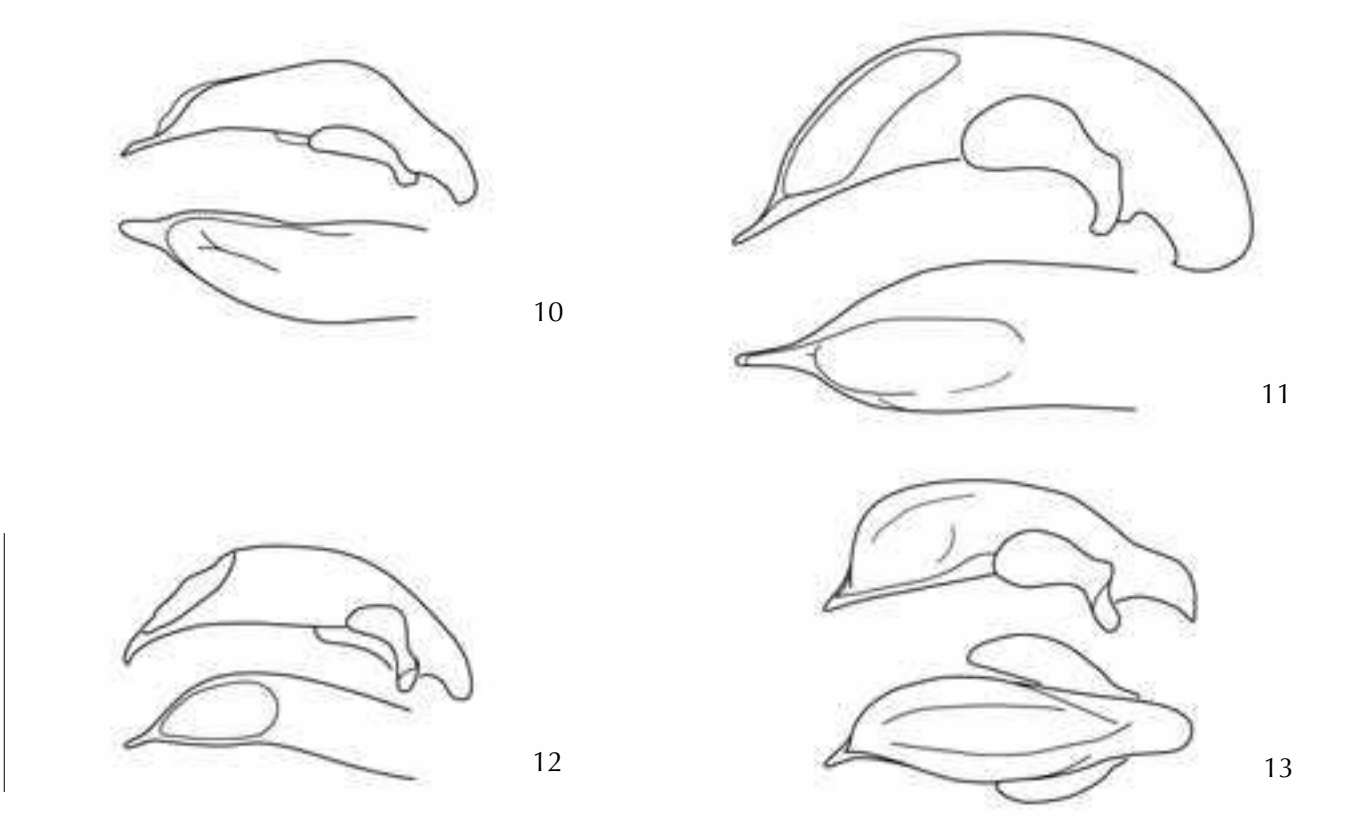
Diploharpus perpolitus Bates and *D. striolatus* Bates are smaller (average 5.5 mm in both species) than *D. curtulus* n. sp. and *D. rossii* n. sp., with paler appendices, bigger eyes, shorter mandibles, and a less convex body. *Diploharpus mexicanus* (Chevrolat) is slightly bigger than *D. perpolitus* Bates and resembles *D. curtulus* n. sp. by the form of the pronotum, with basally sinuate lateral margins and sharp hind angles. Yet, *D. mexicanus* has bigger and more convex eyes, broader base of pronotum, more elongate elytra, and in this species the elytral striae are completely obsolete.

Compared with the rest of the described species, *Diploharpus pubescens* n. sp. is a rather isolated taxon. The pubescent condition of the dorsum and abdomen is a conspicuous and surprising feature, presently unique in the genus and uncommon in the tribe. Other presumably derived characters of *D. pubescens* are: reduced hind wings, rugose frons combined with depressed vertex, narrowed base of pronotum, short antennae and tarsi, terete or partly obsolete carina at apex of 8th interval.

Owing to the absence of carina at apex of 7th interval (fig. 7), it could be assumed that *D. pubescens* belongs to the group of *D. laevissimus* Chaudoir. Nonetheless, we must take into account a tendency to the reduction of elytral sculpture (namely, erased striae and flattened carina of 8th interval), so that the true phyletic affinities of this species remain unclear.

Way of life

Very little can be said about the ecology of *Diploharpus*. Like most Carabids, they are terrestrial, nocturnal predators. Adult *Diploharpus* are



Figs. 10-13. Aedeagus, lateral and dorsal view; 10: *Diploharpus pubescens* n. sp.; 11: *D. iridescens* n. sp.; 12: *D. curtulus* n. sp.; 13: *D. rossii* n. sp. Scale bar 1 mm.

usually found under barks of dead, rotten trees and in decaying leaf litter. In Central America, during the dry season, they hide in deep leaf piles beneath crowns of fallen trees (Erwin & Sims, 1984: 393). In Ecuador, all known species are strictly sylvatic, from tropical lowland forest to subtropical montane forest. At Otonga Natural Reserve (Ecuador, province Cotopaxi, on the western slope of the Andes), the major part of the specimens were found under bark of fallen trees on in rotten logs. However, *D. rossii* n. sp. was observed soon after sunset running around on the surface of leaf litter in search of preys (personal observation at Otonga, VII.5.2001). *D. pubescens* n. sp. was collected at night on the surface of a fallen branch (personal observation at El Higuerón, VII.26.1998). Similarly, at the Biolat station of Río Manu, in Eastern Perú, T. L. Erwin found various *Diploharpus* species "on living trunks at night near exuding sap and on broken punky wood on the ground" (Erwin, 1991: 44).

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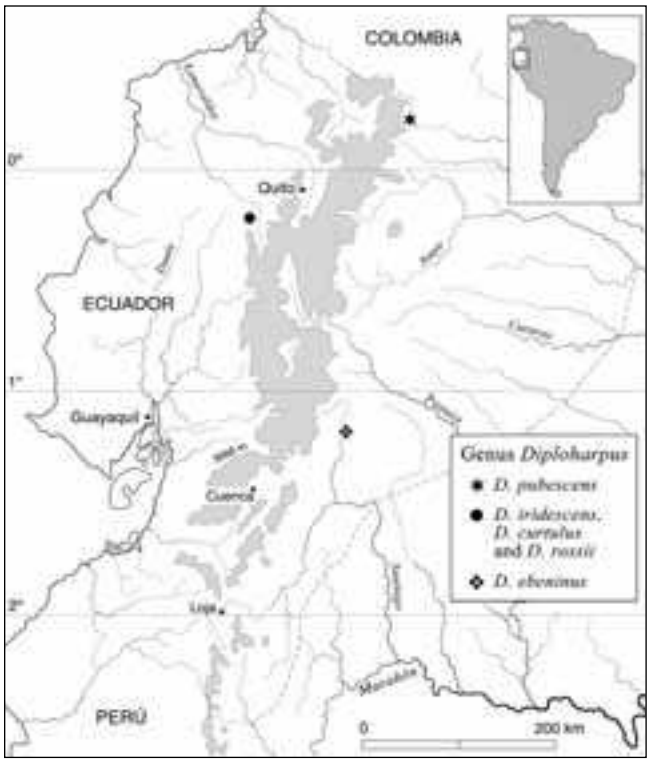

Fig. 14. Distribution map of five *Diploharpus* species found in Ecuador.

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